CNC-210A Series

Technical Manual

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1. INTRODUCTION

CNC-210A is a series of COIL WINDING MACHINE CONTROLLER developed by **TAILY AUTOMATION**. It not only retains all the features of previous designs, it also has a low noise level and is less sensitive to external power fluctuation. Furthermore, it also includes a RS-485 network interface, making coil-winding operation easier to manage.

CNC-210A also features an integrated design: putting stepper motor driver, DC motor speed controller, brake and power supplier control circuits into one control box, simultaneously achieving size reduction, high performance and low cost.

CNC-210A Series offers CNC-210AS “Standard Model” and CNC-210AE "External Connection Model”, depending on whether a close-loop driver is provided for various applications.

MODEL	Winding Spindle	Guiding Traverse
CNC-210AS	Drive 0.5hp DC motor in directly.	Drive two phases 2A STEP motor in directly.
CNC-210AE	External connect winding spindles motor driver.	Drive two phases 2A stepper motor in directly, Or external connect guiding traverse STEP motor driver.

2. MAIN FEATURES

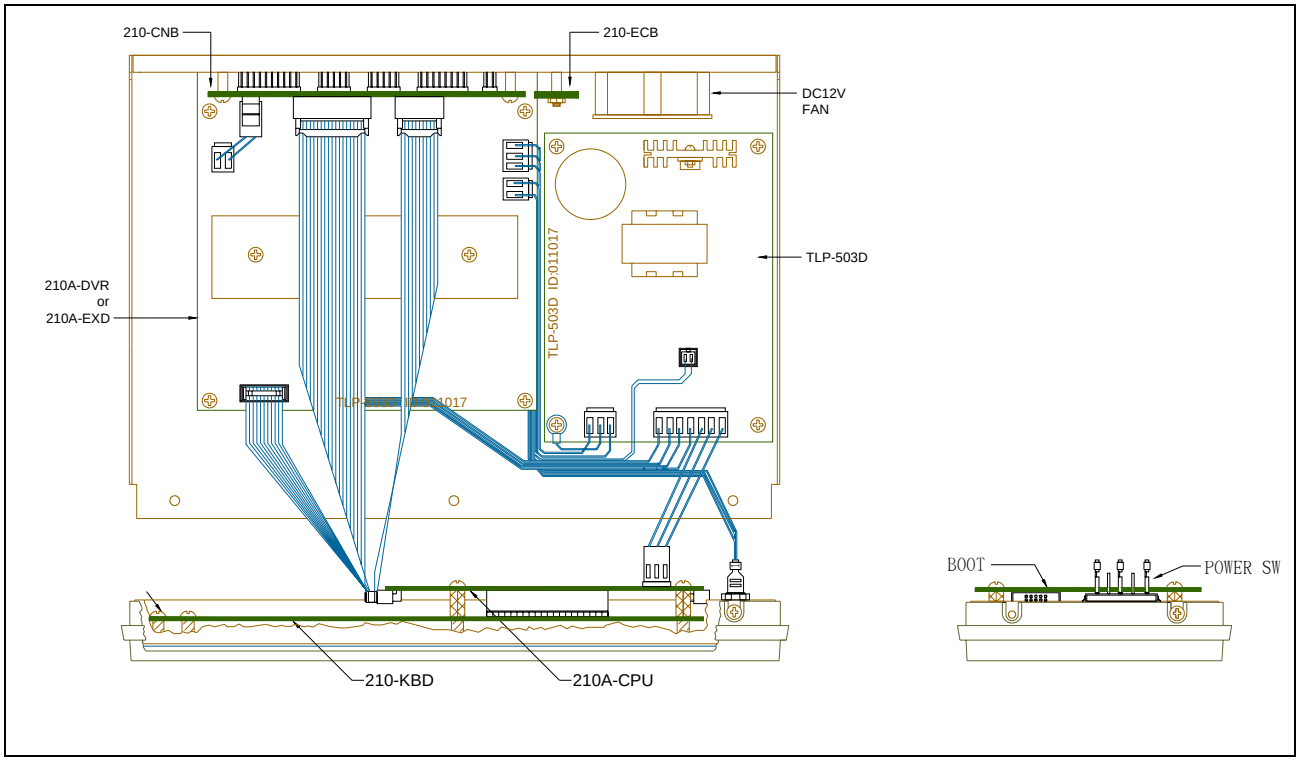
- ◆ Single chip Microprocessor design, has further higher performance and higher functions; it also has less sensitive to external power fluctuation or to external electromagnetic interference.
- ◆ Memory use FLASH ROM, capacity capable storing up to 1000 steps winding data, 9 winding parameters, and 5 options can be independently assigned for each step. Off-power memory retention without battery.
- ◆ Winding speed can be specified using the front panel keypad, resulting in easy programming of multi-step, multi-speed settings.
- ◆ Guiding traverse shaft stepper motor with a constant-current driver offering fast wire guiding speeds.
- ◆ Guiding traverse shaft offering 10 steps moving speed selection.
- ◆ Offering RS-485 interface for PC linking and data transfer.
- ◆ Software can be update through the personal computer.
- ◆ Power input AC100V~120V、220V~240V 600VA(max).

3. CONSTRUCTION OF CONTROLLER

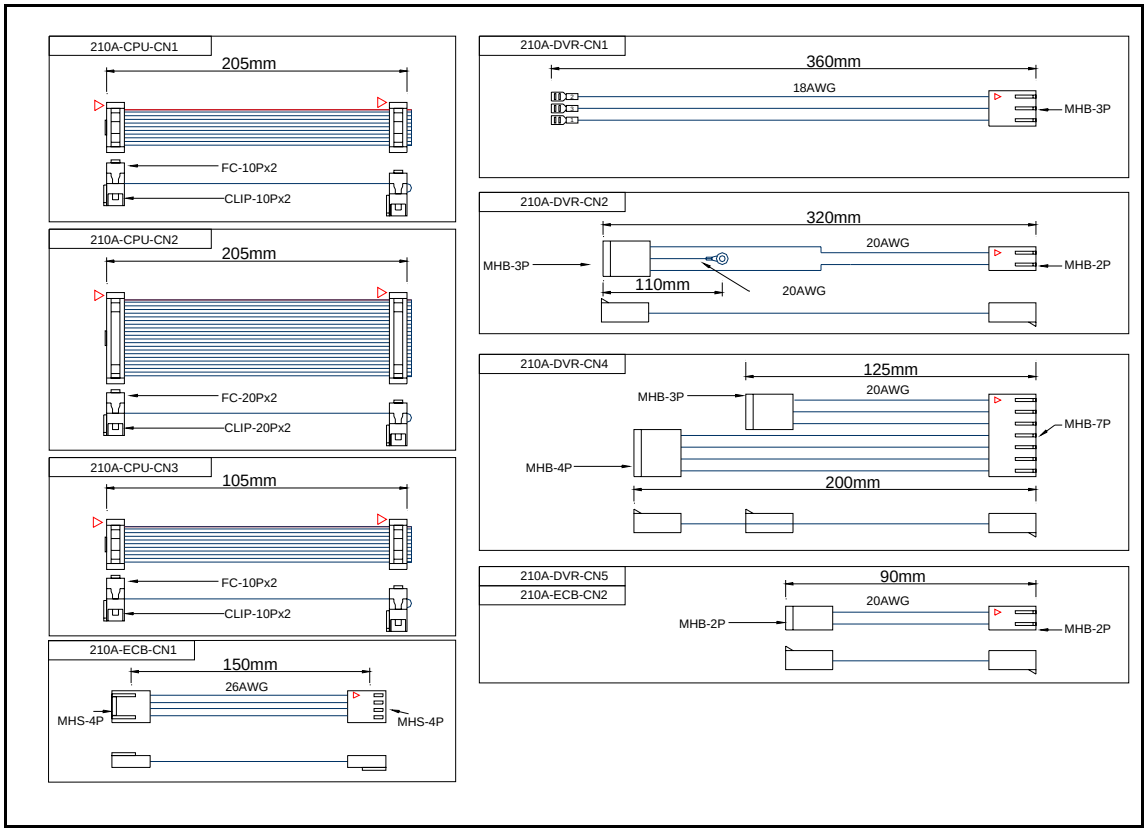
3.1. Internal parts list

NAME	CNC-210AS	CNC-210AE	NOTE
210-KBD Key pad and display board	○	○	
210A-CPU Master control board	○	○	
210A-DVR Motor control board	○	X	
210A-EXD Motor control board	X	○	
210A-CNB Wire connection board	○	○	
TLP-503D Power supply board	○	○	
201A-ECB Wire connection board	X	○	
210A-CPU-CN1 Flat cable	○	○	
210A-CPU-CN2 Flat cable	○	○	
210A-CPU-CN3 Flat cable	○	○	
210A-DVR-CN1 Cable	○	○	
210A-DVR-CN2 Cable	○	○	
210A-DVR-CN4 Cable	○	○	
210A-DVR-CN5 Cable	○	○	
210A-ECB-CN1 Cable	X	○	
210A-ECB-CN2 Cable	X	○	
DC12V FAN	○	○	
“X “ = not used in this model			

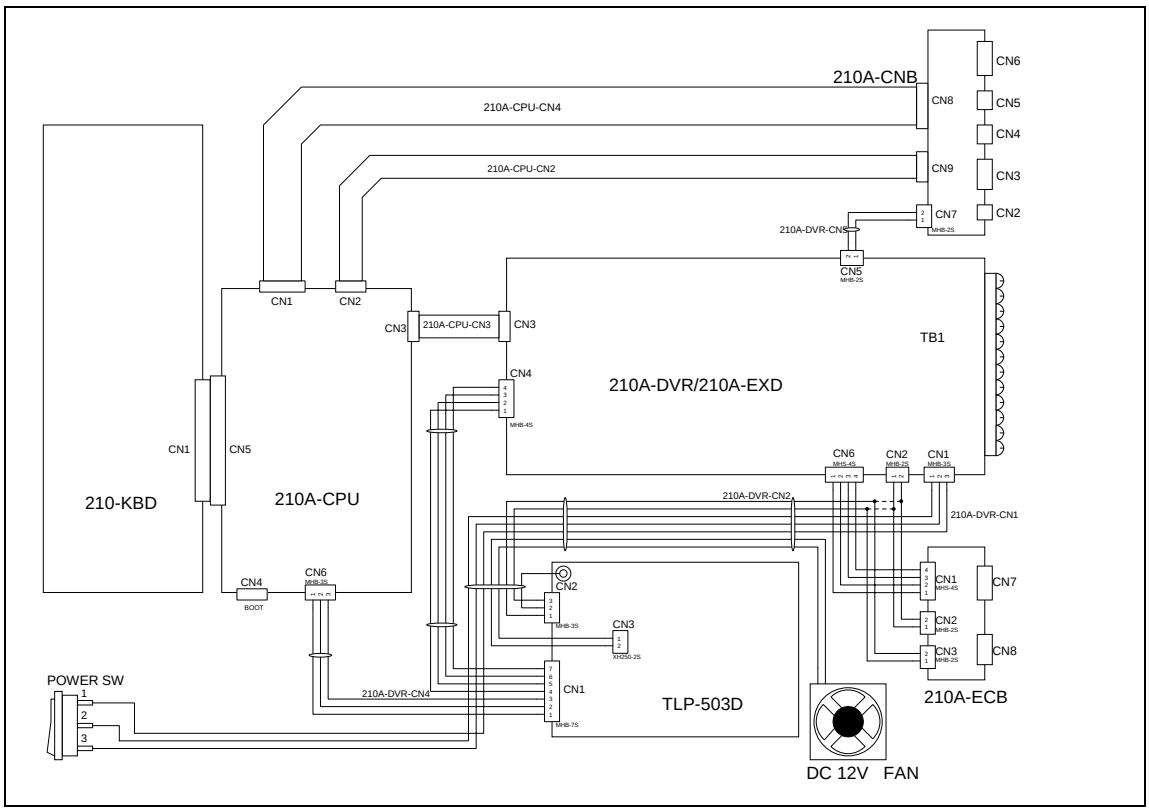
3.2. Assembly diagram



3.3. Internal connectors and cables specification



3.4. Internal wiring diagram



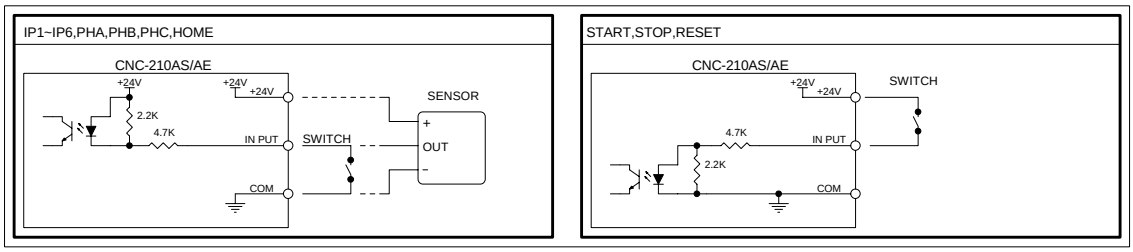
4. INSTALLATION AND WIRING

- The controllers should be operated in an environment that is protected from moisture, corrosive gases, oil mist, and free from airborne dust, metallic particles, and magnetic noise.
- Normally operate under 10℃~40℃environment. Do not block the intake/exhaust ports of the controller. Otherwise, a fault may occur.
- Make sure that the power source supplies the correct voltage and is capable of supplying the required current to the controllers.
- Do not connect or disconnect wires and connectors while power is applied to the controller.
- Make sure that the machine and controllers are properly grounded.
- Make sure that the leads and connectors are connected correctly.

4.1. I/O signal Interfaces description

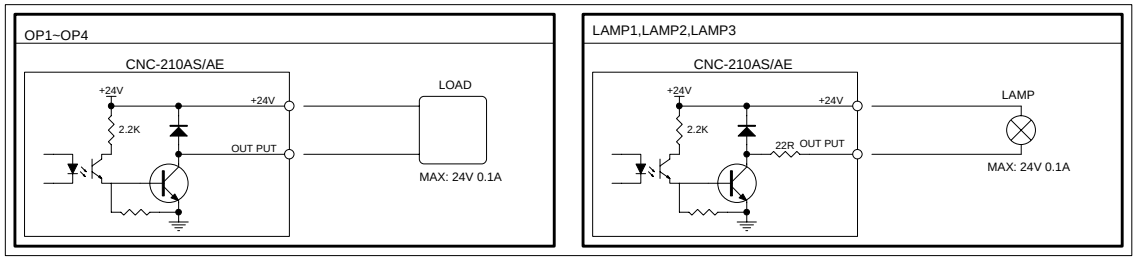
- Digit input interfaces：

  Give a signal with a relay, switch or open collector transistor.

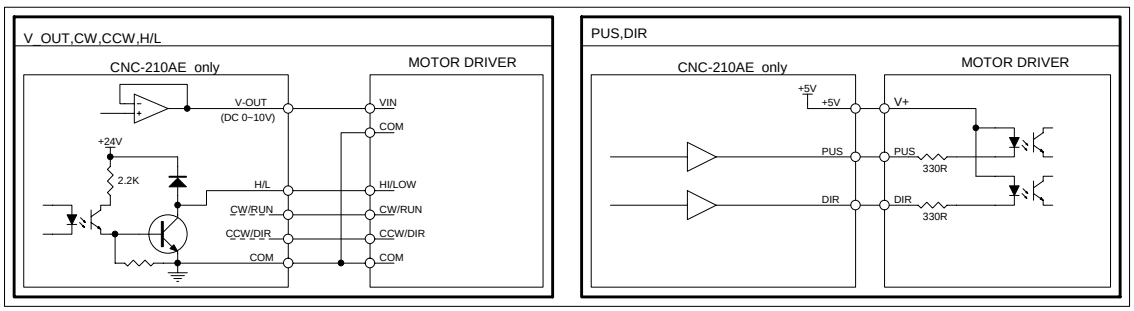


- Digit output interfaces：

  A lamp, relay or photo coupler can be driven.



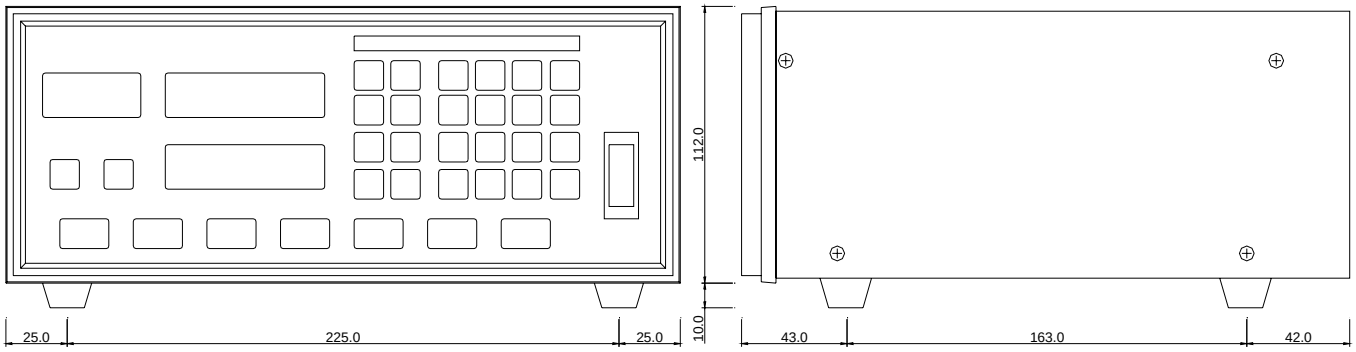
- Motor control signal interfaces：(for CNC-210AE only)



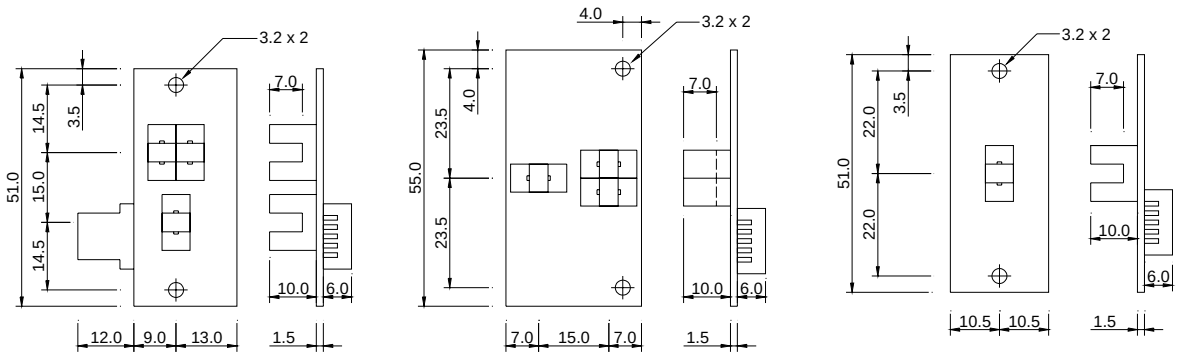
4.2. Accessories List

NAME		CNC-210AS	CNC-210AE
210A-CN2	RS-485 Connection box	○	○
210A-CN3	Operate switches connection cable	○	○
210A-CN4	Home sensor connection cable	○	○
210A-CN5	Counting sensor connection cable	○	○
210A-CN6	Aux I/O signal connection cable	○	○
210A-CN7	Pulse output connection cable	X	○
210A-CN8	AC output connection cable	X	○
HOME-SR	Home sensor	○	○
CNTB-03B/C	Counting sensor	○	○
DISC	Counting disc	○	○
START	Push button switch	○	○
STOP	Push button switch	○	○
RESET	Push button switch	○	○
Foot switch	RUN/STOP Foot switch	○	○
Power cord	AC Power cord	○	○
All accessories are optional to purchase.		“X “ = not used in this model	

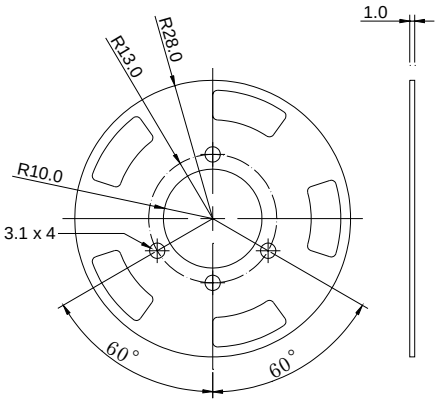
4.3. Dimensions (unit=mm)



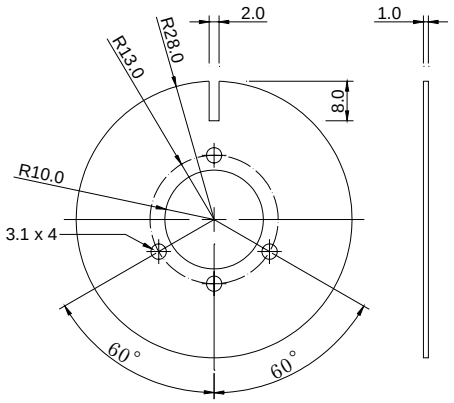
CNC-210AS/AE



CNTB-03B **CNTB-03C** **HOME-SENSOR**



COUNTING DISC

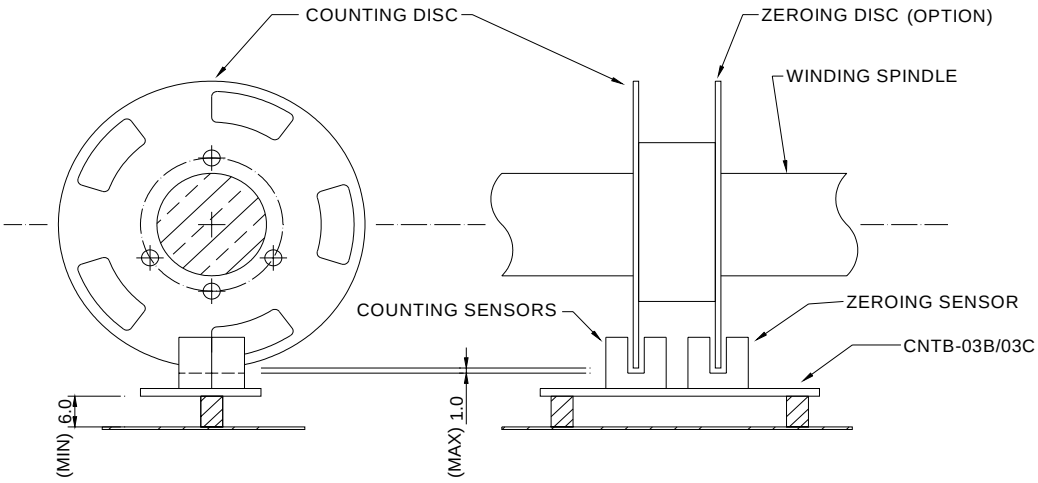


ZEROING DISC

4.4. Counting system assembly (unit=mm)

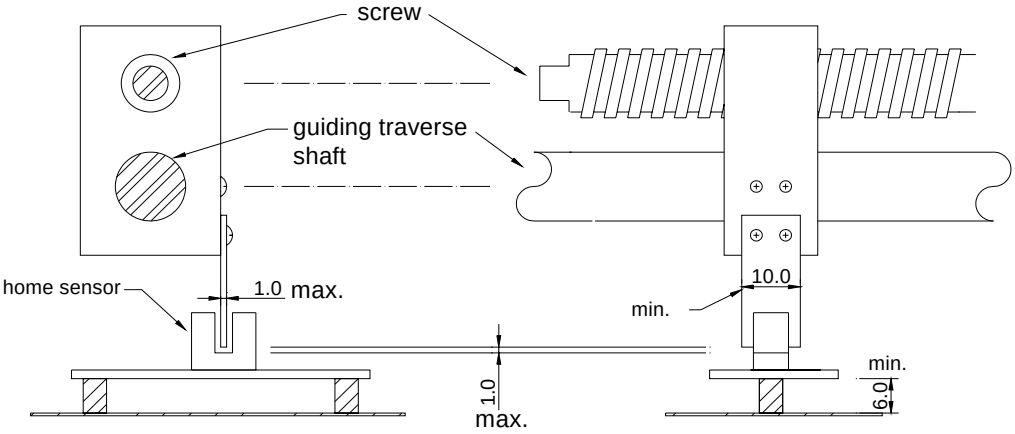
◆ The counting disc and the turn counter must assembly as below, otherwise it will count improperly.

◆ The zeroing disc is not served with the controller. If zero position is necessary for the winding spindle, make a zeroing disc as above and coupling it with counting disc as below.

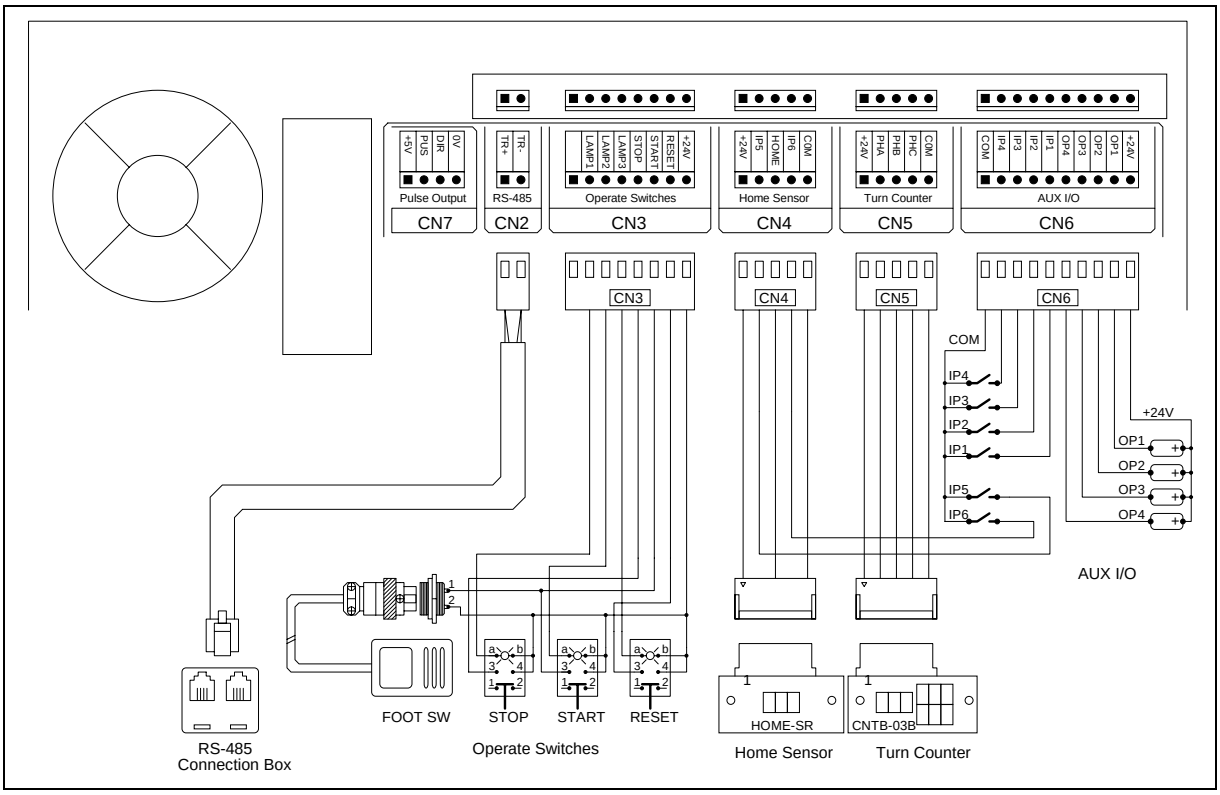


4.5. Home sensor assembly (unit=mm)

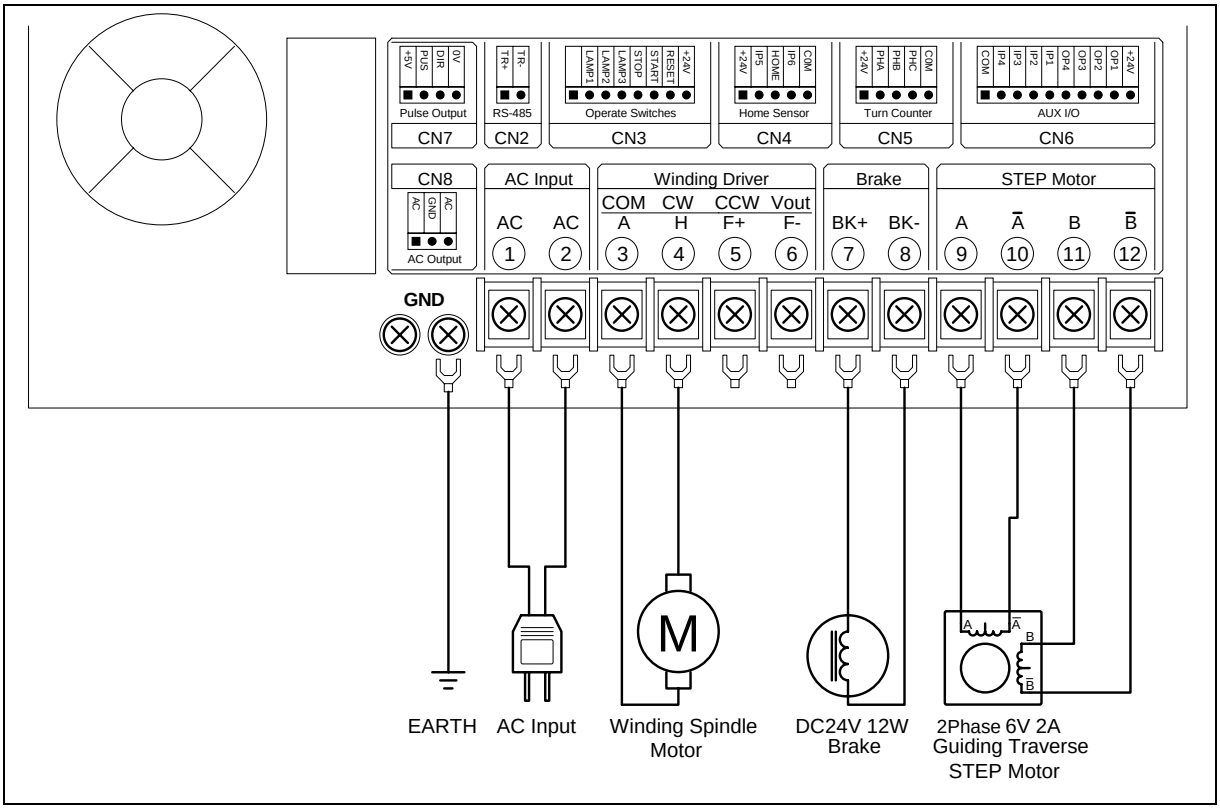
◆ HOME SENSOR must be assembly as below, otherwise a fault may occur.



4.6. CN2~CN6 Wiring diagram for CNC-210AS/AE

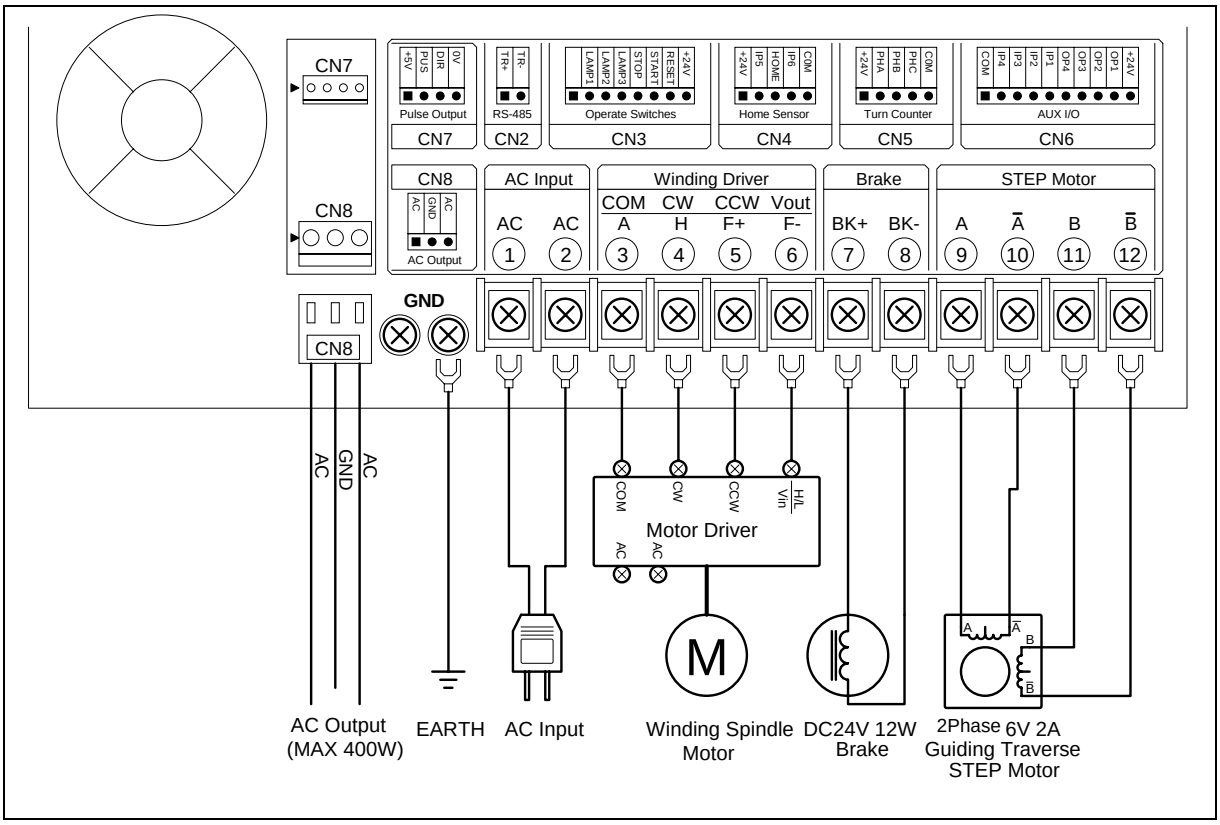


4.7. Wiring diagram for CNC-210AS

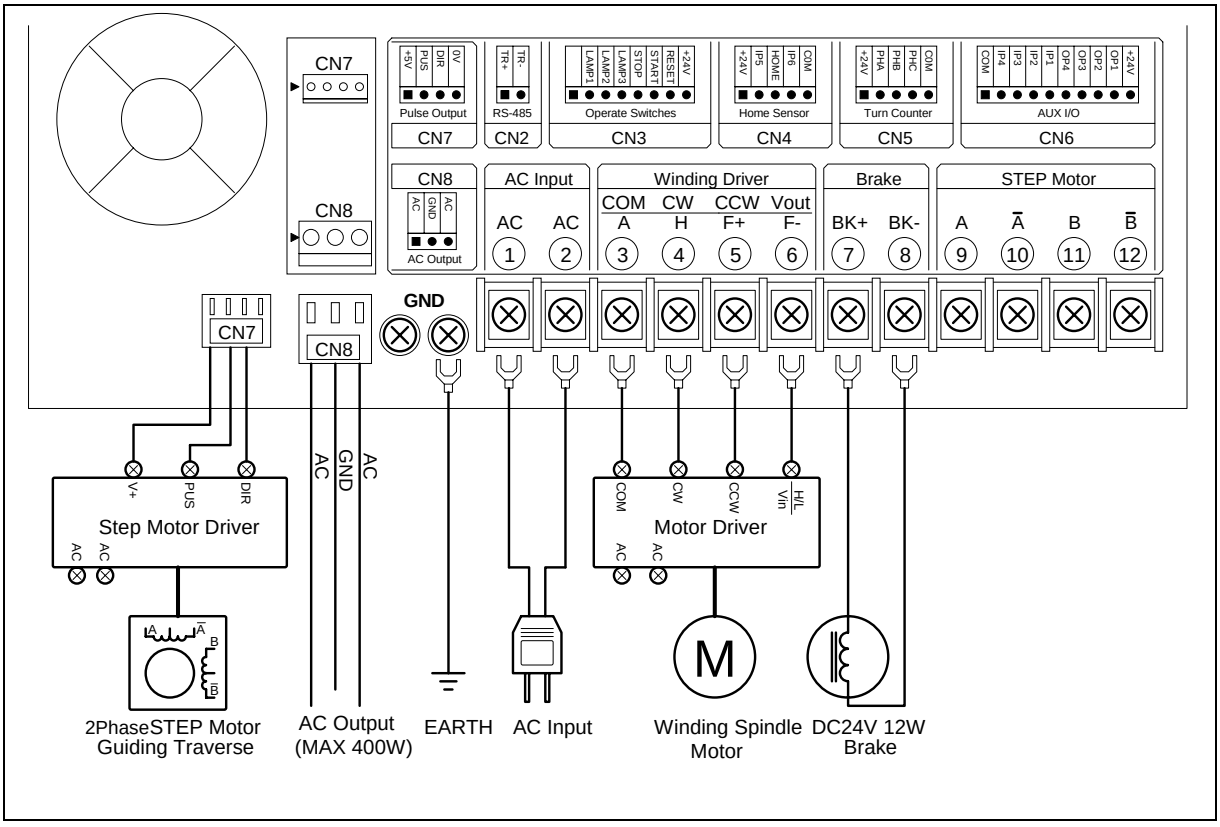


4.8. Wiring diagram for CNC-210AE

◆ Drive STEP Motor in directly



◆ External connect STEP Motor driver



5. ADJUSTMENT

5.1. Adjustments for CNC-210AS

◆ **CL：Maximum Output current limit.**

1. Connect a DC Amperes meter between terminal and DC motor as below.
2. In ready mode press EDIT RPM START to make the DC motor starting rotate and then press BRAKE to holding the winding spindle.
3. Rotate CL to set limited current, show on Amperes meter.
   (2A for 180v DC motor、4A for 90v DC motor).

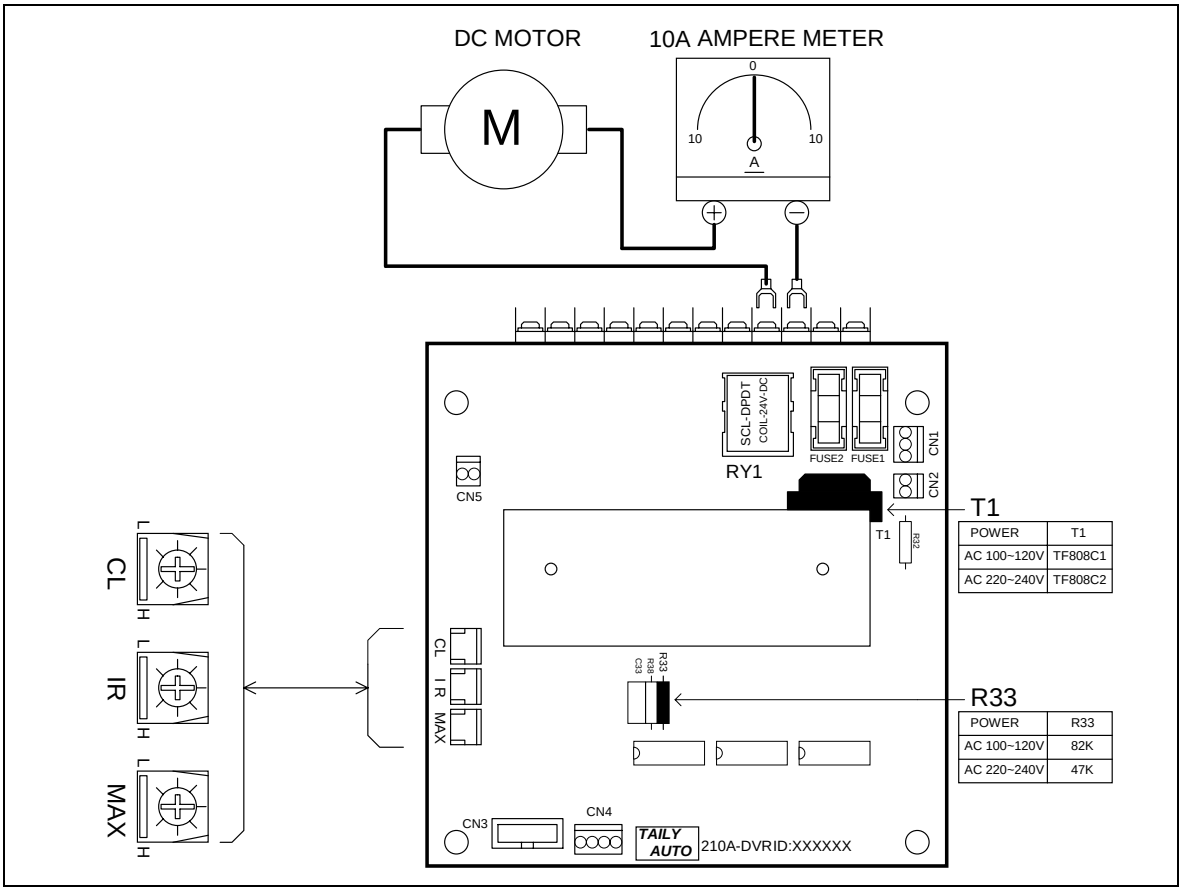
   (The CL have been set by factory before delivery. Only adjust it when change DC motor and replace 210A-DVR driver board.)

◆ **IR：Torque compensation.**

4. Set the winding parameter H.S.、 L.S. in 20, then press RPM to change the DISPLAY shows RPM. Then press START key to start winding.
5. Rotate IR potentiometer to make it in same speed during the winding spindle shaft in full-load and unload. Then press STOP key to stop winding.

◆ **MAX：Maximum winding speed.**

1. Set the winding parameter H.S., L.S. in 99, and press RPM key to change the DISPLAY shows RPM. Then press START key to start winding.
2. Rotate MAX potentiometer to make the winding speed (RPM) as you want.
   Then press STOP key to stop winding.



5.2. Adjustments for CNC-210AE

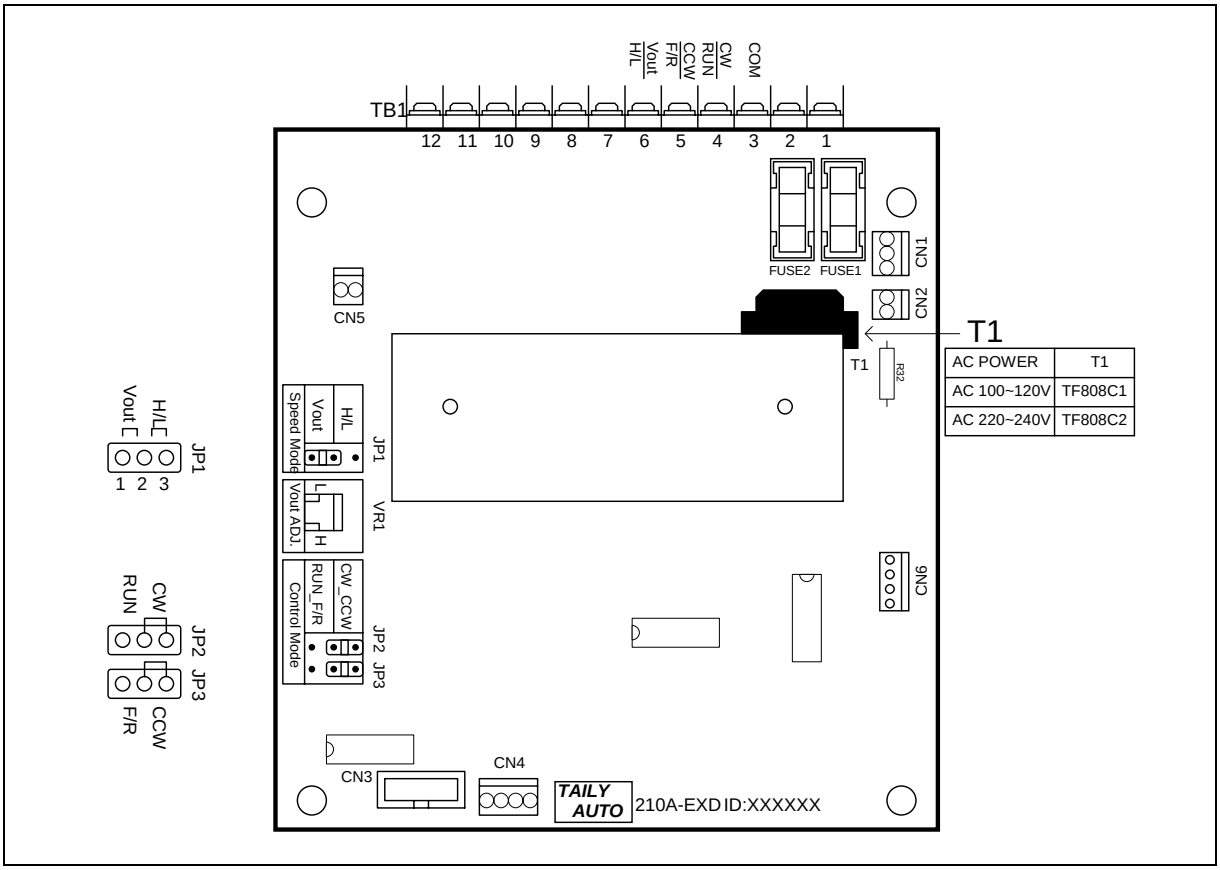
◆ Speed Mode selection

To select the speed signal output mode for winding driver.
Selected by JP1.

1. **V-out mode**：Represents the speed signal with DC 0~10v output.
2. **H/L mode**：Represents the speed signal with HI/LOW lever output.
   Hi speed with HI lever, low speed with LOW lever.

◆ V-out adjust

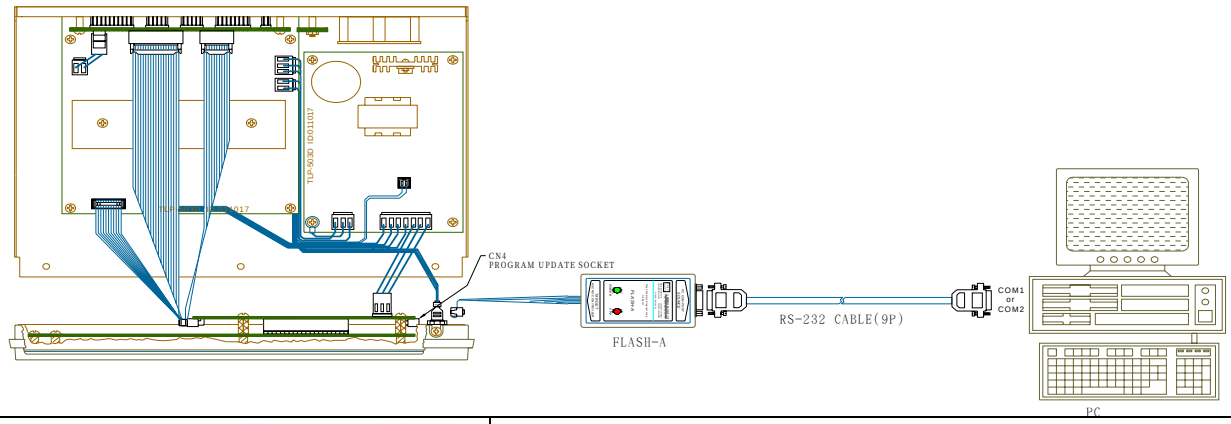
1. Set the winding parameter H.S., L.S. in 99, and press RPM key to change the DISPLAY shows RPM. Then press START key to start winding.
2. Rotate **V-out** potentiometer to make the winding speed (RPM) as you want. Then press STOP key to stop winding.
3. This function only worked in V-out mode.

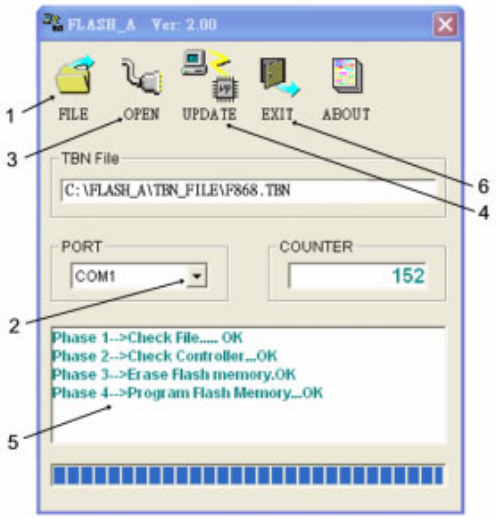


6. PROGRAM UPDATE

The program version of CNC-210A can update through the **PC**

1. Connect the **FLASH-A** and **RS-232** cable between **PC** and **CNC-210A** as below.
2. Put FLASH_A disk into the disk driver (You can also download from www.taily.com.tw), click SETUP.EXE to install software, and then copy the XXXXX.TBN files to the hard disk from TBN_FILE folder. (You can also download from www.taily.com.tw),
3. Click FLASH_A.EXE and follow the procedures below to update program version.





Update procedures

1. Click FILE icon to select file (XXXXX.TBN)
2. Select COM-PORT from PORT list.
3. Click OPEN icon to open the COM-PORT and make UPDATE icon shone, ready to update
4. Click UPDATE to start update.
5. When screen is complete shows **ok!** For four steps, it means program update is finished, the CNC-210A controller will reset automatically and the DATA display shows the number of program version, then get into READY mode.
6. Click EXIT to close the window, or Click UPDATE for another CNC-210A update.

Failure!! Message：

◎Phase 1-->Check File ..Failure !!

The program file is damaged. Please download the file from www.taily.com.tw again.

◎Phase 2-->Check Controller .. Failure !!

a. The program file is not suitable for CNC-210A, please confirm the program filename again.
b. Check the wire connection between **PC** and **CNC-210A** or confirm the COM-PORT select is correct.

◎ Phase 3-->Erase Flash memory .. Failure !!

Please send back the 210A-CPU board for repair.

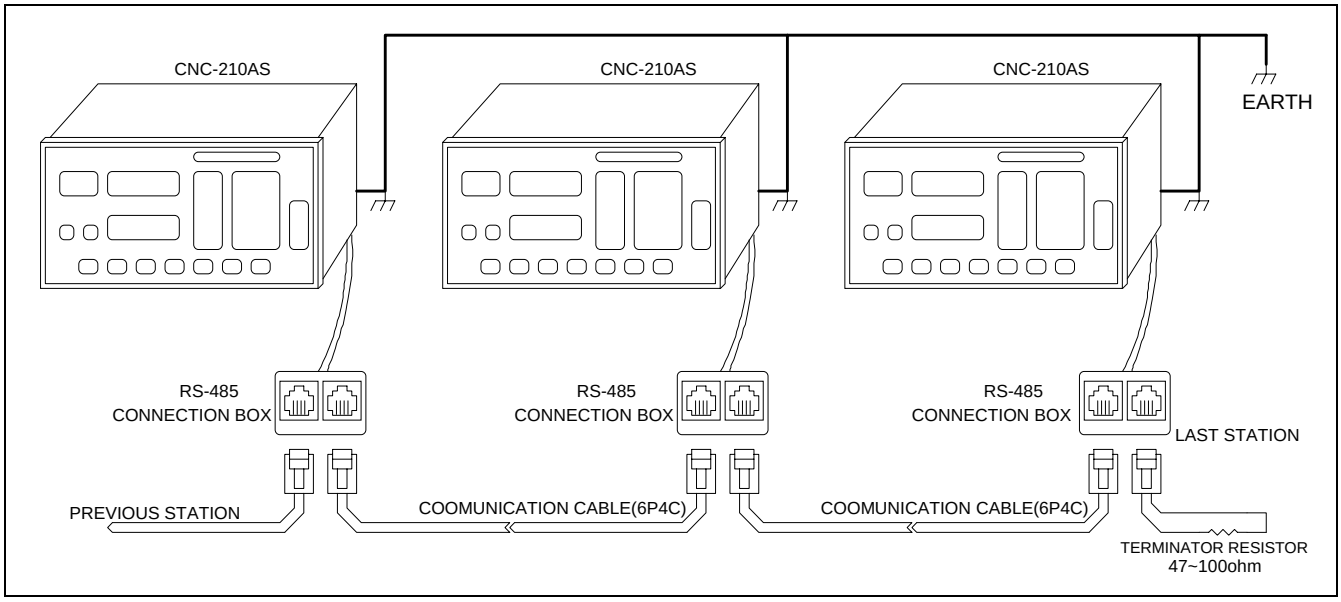
◎ Phase 4-->Program Flash Memory Block.. Failure !!

Please send back the 210A-CPU board for repair.

7. Data transmit

The CNC-210A has a RS-485 serial communication interface, can be used to send the winding data to the others station. Up to 32 stations can be operated on the same network.
In this function, set station numbers to the controllers to recognize the controller to which the current data is being send. (Refer to the section 7.2. station numbers.)

The communication bus wiring diagram as below：



In READY mode press following keys combination, its will sent each setting data to target station.

EDIT COPY 0 00~99 ENT ：Sends configuration setting data to the specify station.
EDIT COPY 1 00~99 ENT ：Sends winding parameters to the specify station.
EDIT COPY 2 00~99 ENT ：Sends password to the specify station.

It will send the winding data from the [START STEP] until to the [END STEP], when sent the winding parameters from one station to another,

00~99 Represents target station number. If the target station number specify as “00”, all the stations on the same network will receive the data is being sent.

8. MAINTAIN AND TROUBLESHOOTING

8.1. Periodically maintain

- ◆ Please periodically clean up the controller inner accumulate dust and departs.
- ◆ Please periodically check the wire connection between controller and machine if have loose or bad contact.
- ◆ The following parts must be maintained or changed periodically as list below. If any part is found faulty, it must be changed immediately even when it has not yet reached the end of its life, which depends on the operating method and environmental condition.
- ◆ For parts replacement, please contact your sales representative.

NO	Parts name	Life guideline
1	Winding spindles Turns counter **CNTB-03B/03C**	2 years
2	Guiding traverses **HOME SENSOR**	2 years
3	**COOLING FAN** (DC 12V 6cm)	10,000 hours
4	**RELAY** (on the 210A-DVR driver board, it used to switching the winding direction)	100,000 times
5	Carbon **BRUSH** of the DC motor	1 year

8.2. Error message

When a fault occurs during operation, the DATA DISPLAY shows error massage, stop winding and then RESET go back to the READY mode.

Err-0： The parameters or data in memory are fault.
Err-1： The『SHIFT』value sets exceed the Travel Limit.
Err-2： During winding, the guiding traverse to exceed the Travel Limit.
Err-3： During winding, the guiding traverses reach to the Home sensor.
Err-5：RS-485 communication error.
Err-p：Password error, key in 4 digits password before edit.

8.3. To abort seeks the original position

At boot and reset procedures, if because of unknown reason however engender the winding shaft and guiding traverse can't find out the original position and make the controller can't get into ready mode, can press STOP key to abort seeks the original position, make controller get into ready mode.

8.4. Troubleshooting

This section provides information to guide the user in understanding different fault condition and their general troubleshooting procedures, and with their possible solutions.

- ◆ Do not connect or disconnect wires and connectors while power is applied to the controller.
- ◆ Make sure that the leads and connectors are connected correctly, before doing the troubleshooting procedures.
- ◆ Do not remove welded parts on the PC board without appropriate tools.

NO	Fault Description	Correctives Action
1	Power ON, but the display shows nothing.	**a.** Check AC power input. **b.** Check the LED lamp on TLP-503D power supply, if not lit replace TLP-503D **c.** Replace 210A-CPU.
2	Power ON, but the display shows confusion massage,	**a.** Replace 210A-CPU.
3	Power ON, but winding spindle didn't rotate, or cannot stop rotation, And controller cannot get into ready mode.	**a.** Press STOP to make the controller get into READY mode. **b.** Check the winding parameter『L.S.』setting value of START STEP。 **c.** Replace turns counter CNTB-03B. **d.** Replace 210A-CPU.
4	Power ON, but guiding traverse didn't move or cannot stop moving, And controller cannot get into ready mode.	**a.** Press STOP to make the controller get into READY mode. **b.** Replace HOME SENSOR. **c.** Replace 210A-DVR. **d.** Replace 210A-CPU.
5	Cannot edit parameters.	**a.** Check the READY LED lamp if not lit, do procedures number 3 and 4. **b.** Key in four numbers password before edit, if the password has been set before. **c.** Replace 210-KBD. **d.** Replace 210A-CPU.
6	Display shows Err-0, then reset, and get into READY mode.	**a.** Replace 210A-CPU.
7	Display shows Err-1/Err-2 then reset and get into READY mode.	**a.** Check winding parameters 『SHIFT』and 『WIDTH』setting value. **b.** Check configurations 『TRAVEL LIMIT』setting value.
8	Display shows Err-3, then reset, and get into READY mode.	**a.** Check winding parameters 『SHIFT』and 『WIDTH』setting value. **b.** Replace HOME SENSOR.
9	Display shows Err-5.	**a.** Check wire connection of RS-485 connection box. **b.** Check wire connections between two stations.
10	Brake failure.	**a.** Check wire connections of brake. **b.** Replace brake. **c.** Replace 210A-DVR.
11	Winding spindle can not switching winding direction.	**a.** Check configurations 『Winding spindle control mode selection 』setting value. **b.** Replace 210A-CPU.
12	Counting failure.	**a.** Replace turns counter CNTB-03B. **b.** Replace 210A-CPU.
13	Guiding traverse moves half pitch or double pitch.	**a.** Check Configurations『Moving increment』setting value.
		a.

9. SPECIFICATIONS

Model		CNC-210AS	CNC-210AE
Control system		Single chip microprocessor	
Keyboard		33 keys key pad	
Display		13 digits 7-segment display, 27 LED lamps.	
Memory		FLASH ROM ， Capable storing up to 1000 steps	
Communication		RS-485 interface	
Winding Parameter	SHIFT	0.01~999.99mm	
	WIDTH	0.01~999.99mm	
	PITCH	0.001~9.999mm	
	TURNS	0.1~9999.9turns/1~99999turns	
	S.SLOW	0.1~999.9turns	
	E.SLOW	0.1~999.9turns	
	H.S.	1~99%	
	L.S.	1~99%	
	FUN	Special occasions	
	Options	FEED DIR, WIND DIR, EDGE STOP, AUTO HOME, AUTO START	
Winding spindle shaft	Control signal	Driver 0.5HP DC motor in directly	HI/LOW lever or V-out (DC 0~10V) speed signal output
			CW/CCW control signal output
	Counting	A, B, C, 3 phase, with Absolute/Relative counting	
	Brake	DC24V/12W brake control output	
Guiding traverse	Output	Drive two phases 2ASTEP motor in directly.	Drive two phases 2A STEP motor in directly or PUS, DIR control signal output for external connect STEP motor driver.
	Unit	Moving increment 0.01/0.02/0.04mm selection	
Input function		RESET、STOP、START	
Output signal		RESET、STOP、START lamp control(DC24V 0.1A)	
Auxiliary I/O		4 input (DC24V) and 4 output (DC24V 0.1A)	
AC Power		AC 110V、220V、240V 600VA(MAX)	
Ambient temperature		10℃~40℃	
Dimension		270(W)×248(D)×113(H)	
Net weight		3.0KG	